

Patent Application

TO ALL WHOM IT MAY CONCERN

Be it known that I, Michael Dayoub, being a citizen of the United States of America, have invented certain new and useful improvements in a

**POWER STRIP WITH SMOKE DETECTION AUTO-SHUTOFF**  
of which the following is a specification.

## **POWER STRIP WITH SMOKE DETECTION AUTO-SHUTOFF**

### **CROSS REFERENCE TO RELATED APPLICATION**

None

### **BACKGROUND OF THE INVENTION**

The invention's purpose is to provide an A/C (alternating current) power supply which cuts off power to attached electrical devices if smoke is detected. The invention must do so without the need for signals from remote smoke detectors or  
5 monitoring equipment.

The need for the invention arose from a spate of fires in Georgia in unattended settings. Those settings could not afford expensive security and fire monitoring services. They were barns, greenhouses and cabins where alarms would not be heard but where space heaters were used to prevent temperature damage to plants, animals,  
10 equipment, or other property. Other attended and unattended settings may also benefit from use of the invention. For example, the invention may also be used in conjunction with a monitoring service, when quick shutoff is needed of equipment such as ventilation fans or other fire dangers.

### **SUMMARY OF THE INVENTION**

The invention is a power strip with an internal smoke detection device, which cuts off AC electrical power to attached electrical devices if smoke is detected. The invention does so without the need for signals from remote smoke detectors or  
5 monitoring equipment. Power flows through the power strip to user AC outlets, unless smoke is detected, at which point the smoke detector creates a trigger voltage, shutting off power to the outlets.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is an external illustration of the casing, commonly referred to as a power strip, for the invention.

5           Figure 2 is a block diagram of the electronic flow within the casing (power strip) for the invention.

Figure 3 illustrates the interaction of the trigger voltage with the smoke detector controlled switch to shut off AC power.

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## **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

Beginning with Figure 1, the smoke detecting power strip appears much like any power strip with a noticeable difference being Smoke Detector Vent Holes 22 on the housing which allows air into the enclosure for the purpose of smoke detection. The invention consists of housing for the power receptacles and electronic components, a power cord with a plug to receive supplied AC power 1, and User AC plugs 11 to provide power to other devices plugged into the invention.

10           The preferred embodiment of the housing is a metal box or strip with one or more User AC plugs 11 (such as NEMA 5-15R, for example) for equipment to plug in and receive A/C power. The housing contains an ON/OFF switch 3 to manually halt or enable power to attached devices. The housing contains one or more Reset switches 25 to re-enable power to those devices after a power surge, electrical short, or smoke is detected. An optional LED indicator 16 on the housing can be provided to show detection of smoke. Furthermore, a smoke detector test button 27 may be included as an optional feature. An electrical cord from the box or strip and a male A/C plug 24 is used to attach the power strip to standard 120V AC power outlet. It will be obvious to those skilled in the art that the invention can be manufactured to operate with any other AC voltage, including without limitation 220V AC.

20           In its preferred embodiment the invention's housing has mounting holes 26 to allow the housing to be mounted on a surface above possible combustible material or machinery. This optimizes the smoke detecting potential and reduces the possibility of liquids entering the housing through the Smoke Detector Vent Holes 22 during floods or other mishaps.

25           It will be obvious to those skilled in the art that the number or configuration of  
AC sockets is nonessential to the invention. One or two or more rows of User AC  
outlets 11 can be used to accommodate the needs of the industry or consumer.  
Moreover, industry producers may choose to include surge protection, a GF circuit  
breaker, an audible smoke alarm, a Smoke Detected indicator light, a Power ON/OFF  
30 indicator light, a Test switch for smoke detector, a Test switch for GF circuit breaker or  
any other accoutrement common to either a power strip, a UPS, or a smoke detection  
device.

Turning to Figure 2, input AC power 1 is routed first through a main power  
ON/OFF switch 3 and a ground fault circuit breaker 5. For ground fault and circuit  
35 overload protection, a typical off-the-shelf ground fault circuit breaker 5 such as  
Hwawon Electronic's HW-15-MB would be suitable, but industry producers could use  
any such ground fault and circuit overload protection as would be appropriate to their  
target consumers' needs.

AC power is conducted to both the smoke detector components 10 and a smoke  
40 detector-controlled switch 9 which is controlled by the invention's Smoke Detector  
Components 10. In its preferred embodiment the smoke detector-controlled switch 9 is  
a mechanical relay such as NTE Electronic Inc.'s R25-5A16-120 16 Amp 120V AC  
SPDT relay but it could be any other type of electronically controlled switch. When the  
smoke detector-controlled switch 9 is in the closed state, AC power is conducted  
45 through smoke detector-controlled switch 9 to the User AC outlets 11.

If provided, UPS components 17 are placed in the invention's housing,  
electrically located between the Smoke Detector controlled switch 9 and the User AC  
outlets 11. When the smoke detector-controlled switch 9 is in the closed state, AC  
power is conducted through smoke detector-controlled switch 9 to the UPS components  
50 17 and then through the UPS components 17 to the User AC outlets 11.

It will be obvious to those skilled in the art that placement strategies and  
electromagnetic shielding could be used in the preferred embodiment to protect  
electrical components from disruptive electrical fields generated during the relay's  
switch action without affecting the invention. It will further be obvious to those skilled  
55 in the art that all UPS functionality of the invention can be implemented with widely  
available hardware and battery cell technology, and is immaterial to the novelty of the  
invention. The novelty of the invention does not depend on a specified power rating or  
duration of UPS battery function.

Now looking at Figure 3, the smoke detector components 10 draw AC power  
60 for smoke detection and logic purposes. In its preferred embodiment, smoke detector  
components 10 constitute a photodiode smoke detector. In such a photodiode smoke  
detector, when smoke is present between the emitter and photodiode, the photodiode  
senses additional scattered light which causes the photodiode to pass additional current  
to the application integrated circuit 15. The application integrated circuit 15 is a  
65 commercially available integrated circuit which amplifies the current from the  
photodiode and executes its algorithm to determine whether to output alarm conditions  
to buzzers and LED's or other electrical devices.

Upon detection of smoke, Smoke Detector components 10 cause application  
integrated circuit 15 to emit trigger voltage 21, causing Smoke Detector controlled  
70 switch 9 to go into the open position. If there are no UPS components 17, then the  
Smoke Detector controlled switch 9 in the open position interrupts the flow of AC  
power to User AC outlets 11.

If UPS components 17 are present, then when the Smoke Detector controlled  
switch 9 goes into the open position, AC power to the UPS components 17 is stopped.  
75 In its preferred embodiment the UPS components 17 contain a separate logic chip  
which is set to disable AC power to the User AC ports 11 on presence of the trigger  
voltage 21 from the smoke detector block's application integrated circuit 15.

It will be obvious to those skilled in the art that the smoke detection technology  
selected is immaterial to the patent. In its preferred embodiment as described above,  
80 the method is detection of infrared light scattered by smoke. Other known smoke  
detector technologies commercially available and practical for use in the invention are  
Ionization detection and beam interference detection. The invention could exploit other  
technologies, whether in existence and unknown to the invention or those developed or  
improved in the future, without affecting the novelty of the invention.

85 As will be apparent to one of ordinary skill in the art, the foregoing describes  
the preferred embodiment of the invention, but there are doubtless modifications,  
alterations or adaptations of the preferred embodiment. It is the inventor's intention to  
claim all such modifications, alterations and adaptations within the spirit and scope  
defined in the following claims.